DOCUMENT RESUME

ED 468 803 SE 066 715

AUTHOR	Sanderson, Allen; Dugoni, Bernard
TITLE	Interstate Migration Patterns of Recent Science and Engineering Doctorate Recipients. InfoBrief.
INSTITUTION	National Science Foundation, Arlington, VA. Div. of Science Resources Statistics.
REPORT NO	NSF-02-311
PUB DATE	2002-02-00
NOTE	10p.
AVAILABLE FROM	National Science Foundation, 4201 Wilson Blvd., Arlington, VA 22230. Tel: 301-947-2722; e-mail: paperpubs@nsf.gov. For full text: http://www.nsf.gov/sbe/srs.
PUB TYPE	Numerical/Quantitative Data (110) -- Reports - Research (143)
EDRS PRICE	EDRS Price MF01/PC01 Plus Postage.
DESCRIPTORS	Doctoral Degrees; Engineering Education; Ethnicity; Gender Issues; Graduate Study; Higher Education; *Migration; Science Education

ABSTRACT

This document reports on the interstate migration patterns of recent science and engineering doctorate recipients. The study examines individuals who earned a doctorate degree in science or engineering from a U.S. university from birth through postgraduate employment. Data was collected using the Survey of Earned Doctorates (SED) for the academic year 1999. (YDS)

Reproductions supplied by EDRS are the best that can be made
from the original document.

ED 468 803

Interstate Migration Patterns of Recent Science and Engineering Doctorate Recipients

InfoBrief

Science Resources Statistics (SRS)

by Allen Sanderson and Bernard Dugoni

February 2002

National Science Foundation
Directorate for Social, Behavioral, and Economic Sciences

NSF02-311

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
This document has been reproduced as received from the person or organization originating it.
Minor changes have been made to improve reproduction quality.
Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

SE 066 715

INFOBRIEF SRS Science Resources Statistics

National Science Foundation
Directorate for Social, Behavioral, and Economic Sciences

NSF02-311
February 2002

INTERSTATE MIGRATION PATTERNS OF RECENT SCIENCE AND ENGINEERING DOCTORATE RECIPIENTS

by Allen Sanderson and Bernard Dugoni[1]

Introduction and Overview

Mobility is a vital element in any population and labor force. How willingly families and workers will migrate from one location to another in search of opportunities for advancement or to seek additional training constitute important indicators of economic growth and development. "Brain drain" and "brain gain" issues are of interest to governmental authorities and have significant implications for support of higher education and other legislative initiatives.

This InfoBrief examines the extent and pattern of interstate migration of recent science and engineering (S&E) doctorate recipients from birth through initial postgraduate employment. The study focuses on U.S.-born individuals who earned a doctorate in an S&E field from U.S. universities.[2] This is arguably one of the most highly skilled segments of the American labor force, and one for which personal and professional decisions to migrate are of paramount importance.

The data analyzed are from the Survey of Earned Doctorates (SED) for the 1999 academic year (July 1998-June 1999).[3] The 1999 SED collected five chronological "geographical history" data points on the migration of all research doctorate recipients in that academic year. Respondents provided information on their birth state and the state in which they last attended high school, first enrolled in college, earned their doctorate, and accepted or planned to pursue initial postdoctorate employment.[4]

Migration among the S&E doctorate population is both extensive and ongoing.

From the universe of 41,140 research doctorate recipients in 1999,[5] 25,413 received their degree in an S&E field. This investigation was confined to U.S. citizens (14,078); from these were selected those who were born, completed high school, enrolled in college, and received a science or engineering doctorate in one

[1] Allen Sanderson is a senior research scientist at the National Opinion Research Center (NORC) and senior lecturer in economics at the University of Chicago; Bernard Dugoni is senior methodologist at NORC.

[2] The movement of foreign-born U.S.-trained doctorate recipients or the immigration of foreign-trained doctoral degree holders into the United States is not considered here. For a recent comprehensive discussion and overview of many international aspects of migration, see National Science Foundation, Division of Science Resources Statistics, *Graduate Education Reform in Europe, Asia, and the Americas and International Mobility of Scientists and Engineers: Proceedings of an NSF Workshop*, NSF 00-318, Project Officer, Jean M. Johnson (Arlington, VA 2000).

[3] The SED is sponsored by the National Science Foundation and five other Federal agencies and is conducted under contract from NSF by NORC at the University of Chicago. A follow-up survey to the SED, the Survey of Doctorate Recipients (SDR), includes employment information on a sample of S&E doctoral-degree recipients after graduation.

[4] In some instances, a doctorate recipient could live in one state but work in another. Skip patterns in the survey are such that respondents, depending on employment status, could have provided one or the other location but not both. For purposes of this study, no distinction is made between place of employment and place of residence, and the words "work" and "live" are used interchangeably throughout.

[5] The results of the full SED survey are described in A. Sanderson, B. Dugoni, T. Hoffer, and S. Myers, *Doctorate Recipients from United States Universities: Summary Report 1999* (Chicago: National Opinion Research Center, 2000). The Special Section of that report analyzes the migration patterns of all research doctorates.

of the fifty states, the District of Columbia, or Puerto Rico. These further restrictions yielded a subset of 12,763 respondents, which was used to examine both the general pattern of mobility among the new doctorate population and the extent to which migration varied by academic discipline, sex, race/ethnicity, marital status, parental education, and employment sector.

Migration from Birth to Employment

Migration was widespread among native-born S&E doctorate recipients, and this tendency toward educational mobility was exhibited early on. More than a third (35.5 percent) of the subset of 12,763 S&E doctorate recipients finished high school in a state other than the one in which they were born.[6] A similar percentage (37.8 percent) of the new recipients first entered college in a state other than the one in which they earned a high school diploma, a figure that is considerably higher than the percentage reported for college freshmen as a whole.[7] Thus, initially as undergraduates, these doctorate recipients did not resemble other undergraduates with respect to educational migration. (See Table 1.)[8]

This mobility also characterized the transition from college to graduate school and from graduate school to initial post-doctoral employment. Over two-thirds (71.1 percent) of this population received their doctoral degree from an institution in a state other than the one in which they first entered college. More than half—59.2 percent—intended to work, at least initially, in a state other than the one in which they earned their doctorate. (See Table 1.)

Relatively few S&E doctorate recipients returned to prior "roots" for their first postgraduate employment. About one-quarter (24.3 percent) were returning to (or remaining in) the state in which they started college, 25.2 percent to the state in which they last attended high school, and 20.8 percent to their birth state. (See Table 2.)[9] Overall, only 11 percent of the native-born S&E doctorate recipients reported the same state for their birth, graduation from high school, college matriculation, doctorate institution, and planned employment. (See Table 2.)

One possible implication of these data is that there may not be a single period for "brain drain" (or "brain gain"). Migration occurred at various points from birth to employment, although there was a considerably higher level of interstate migration for the doctoral degree than for earlier intervals, indicating that doctoral education may draw from a national market.

Migration and Sex

For large parts of their educational careers, male and female S&E doctorate recipients showed comparable migration patterns. This similarity is observed in migration between birth and the end of high school and continues to hold true for out-of-state college matriculation—37.2 percent of males and 38.7 percent of females entered college in a state other than the one in which they finished high school—and between college matriculation and doctorate-institution choice (70.7 percent versus 71.7, respectively). (See Table 1.)

However, males and females diverged with respect to mobility at first postdoctoral employment; 61.3 percent of males, compared to 56.2 percent of females, intended to work in a state different from the one in which they earned the doctorate. (See Table 1.) In addition, male S&E doctorate recipients were less

[6] This percentage is a lower bound on overall migration because SED data do not capture intrastate moves, which may be more prevalent in geographically large states, nor instances in which families could have moved from one state to another then back again in this 17- or 18-year period.

[7] U.S. Department of Education, National Center for Education Statistics, *Digest of Education Statistics, 1990*, NCES 91-660. Table 189 presents a national estimate of 24 percent of the freshmen in 4-year colleges in fall 1988 enrolled in a different state from where they graduated high school. Since the median age at receipt of the doctorate for 1999 S&E graduates was 32 years, most were college freshmen in 1985; the 1988 data were the closest available.

[8] For an analysis of interstate migration of recent S&E bachelor's and master's graduates by field of study, academic performance, and institution type, see "Who Will Stay and Who Will Leave?" (Research Triangle Park, N.C.: Southern Growth Policies Board, October 2000). This report indicated that students with higher grade point averages for the bachelor's degree were more likely to migrate to another state.

[9] A 1967 report, *Doctorate Recipients from United States Universities 1958-66* (Publication 1489, National Academy of Sciences, Washington, D.C.), showed that 39 percent of doctorate recipients in 1964-66 earned their doctorate in the same state in which they received their high school diploma. This compares with 32 percent (29 percent of S&E and 35 percent of non-S&E) of the 1999 doctorate recipients.

Table 1. **Percentages of native-born U.S. citizen S&E 1999 doctorate recipients who migrated interstate between various life events, by demographic background and employment sector**

Characteristics	Number	Between birth and finishing high school	Between finishing high school and starting college	Between starting college and completing doctorate	Between completing doctorate and first postdoctoral employment[10]
Total[1]	12,763	35.5	37.8	71.1	59.2
Sex					
Male	7,560	35.7	37.2	70.7	61.3
Female	5,203	35.4	38.7	71.7	56.2
Race/ethnicity					
American Indian[2]	81	33.3	28.4	63.0	55.6
Asian[3]	374	42.0	38.2	63.9	51.1
Black	472	32.8	42.2	69.3	59.1
Hispanic[4]	376	27.9	27.1	63.6	56.4
White	11,291	35.8	38.0	71.8	59.6
Marital status[5]					
Married[6]	7,630	---	---	---	56.2
Widowed/divorced[7]	709	---	---	---	52.3
Never married	4,346	---	---	---	65.6
Parents' education					
Some college or less	3,723	21.9	25.0	65.1	55.9
Bachelor's or higher	8,964	41.2	43.2	73.6	60.7
Employment sector[8]					
Academe	2,827	33.6	36.9	71.6	63.0
Government	872	38.5	37.2	70.8	56.4
Industry/business/self-employed	2,815	35.3	36.1	67.7	56.7
Other[9]	661	32.4	39.3	65.8	44.5

--- = Not applicable

[1]Total includes cases not reporting race/ethnicity, marital status, and/or parental education.

[2]Includes Alaskan Native.

[3]Includes Pacific Islander.

[4]This category takes precedence over the racial categories.

[5]Marital status is only reported as of the time of completion of the SED.

[6]Includes those who indicated a "marriage-like relationship."

[7]Includes those who indicated "separated."

[8]Includes only those intending to work (56.2 percent) or not study (43.8 percent), immediately following degree conferral.

[9]"Other" sectors include working for a non-profit organization, teaching in an elementary or secondary school, or employment by the United Nations or another international agency.

[10]State of first postdoctoral employment or residence.

SOURCE: National Science Foundation/Division of Science Resources Statistics, Survey of Earned Doctorates 1999

likely than females to accept initial employment in the state in which they were born, last attended high school, or first matriculated in college. (See Table 2.)

Migration and Race/Ethnicity

The educational mobility of S&E doctorate recipients varied by racial and ethnic group. Asian S&E doctorate recipients were more likely to have moved across state lines between birth and high school graduation—42.0 percent of Asians received a diploma in a state other than the one in which they were born, compared with 32.8 percent and 27.9 percent for blacks and Hispanics, respectively (and 35.8 percent for whites and 33.3 percent for American Indians). Between high school and college, blacks exhibited the highest interstate migration rate.

Table 2. **Percentage of native-born U.S. citizen S&E 1999 doctorate recipients with various patterns of residential stability, by demographic background and employment sector**

Characteristics	Number	First employment after doctorate is in the same state as:[10]				All 5 in the same state[11]
		Birth	Finished high school	Began college	Received doctorate	
Total[1]	12,763	20.8	25.2	24.3	40.8	10.8
Sex						
Male	7,560	19.6	23.3	23.1	38.7	9.9
Female	5,203	22.4	28.0	26.2	43.8	12.1
Race/ethnicity						
American Indian[2]	81	30.9	37.0	33.3	44.4	16.0
Asian[3]	374	25.7	32.4	32.9	48.9	15.5
Black	472	22.7	25.0	24.6	40.9	12.1
Hispanic[4]	376	33.5	37.8	37.5	43.6	18.9
White	11,291	20.1	24.6	23.5	40.4	10.3
Marital status[5]						
Married[6]	7,630	21.6	26.2	25.9	43.8	11.7
Widowed/divorced[7]	709	22.8	29.8	28.9	47.7	12.1
Never married	4,346	19.1	22.7	20.8	34.4	8.9
Parents' education						
Some college or less	3,723	26.0	29.4	29.4	44.1	15.6
Bachelor's or higher	8,964	18.6	23.5	22.2	39.3	8.7
Employment sector[8]						
Academe	2,827	21.5	25.8	25.6	37.0	11.0
Government	872	20.5	26.7	25.7	43.6	11.5
Industry/business/self-employed	2,815	22.6	27.6	26.9	43.3	12.2
Other[9]	661	32.2	38.0	36.2	55.5	17.7

[1]Total includes cases not reporting race/ethnicity, marital status, and/or parental education.

[2]Includes Alaskan Native.

[3]Includes Pacific Islander.

[4]This category takes precedence over the racial categories.

[5]Marital status is only reported as of the time of completion of the SED.

[6]Includes those who indicated a "marriage-like relationship."

[7]Includes those who indicated "separated."

[8]Includes only those intending to work (56.2 percent) or not study (43.8 percent), immediately following degree conferral.

[9]"Other" sectors include working for a non-profit organization, teaching in an elementary or secondary school, or employment by the United Nations or another international agency.

[10]State of first postdoctoral employment or residence.

[11]The respondent was born, finished high school, began college, received doctorate, and accepted first postdoctoral employment, all in the same state.

SOURCE: National Science Foundation/Division of Science Resources Statistics, Survey of Earned Doctorates 1999

Whites and blacks were the most likely to move across states between entering college and completion of their doctoral program. (See Table 1.)

Concerning geographic location of initial postgraduate employment, the similarities are more striking than the differences. However, Hispanics were the most likely of all the racial/ethnic groups to work after the doctorate in a state in which they were born, last attended high school, or enrolled in college. Hispanics were also generally more likely than doctoral recipients in other racial/ethnic categories to have stayed in the same state from birth through doctoral award and employment. (See Table 2.)[10]

[10] This apparent difference could be due to the disproportionate representation of Hispanic doctorate recipients in states such as California, Texas, Florida, and New York, which have large labor markets for doctorate recipients.

Migration and Marital Status

Marital status also has an apparent impact on the migration patterns of S&E doctorate recipients. Three in five (60.1 percent) of doctorate recipients in the population were married at the time they received the degree; another 5.6 percent were widowed, separated, or divorced. A third (34.3 percent) had never been married; this group exhibited a greater tendency to work in a state other than the one in which they earned the doctorate. (See Table 1.) Within all three marital status categories, males were more likely to migrate across a state border for postdoctoral employment than were their female counterparts; men were also less likely to work after graduate school in the state of their birth, high school graduation, or college entry than were women.[11] (This may reflect, in part, a differential effect of the field of doctoral study on migration for employment, and associated sex differences in these fields of concentration.)

Migration and Family Background

S&E doctorate recipients from family backgrounds of higher educational attainment were more mobile than recipients from more modest educational backgrounds. Almost twice the percentage (41.2 percent versus 21.9 percent) finished high school in a state other than the one in which they were born.[12] A similar pattern occurs at other educational markers in these doctorate recipients' lives: students from more highly educated families were more likely to have attended an out-of-state college (43.2 percent versus 25.0 percent), enrolled in college and earned doctorate degrees in different states (73.6 percent versus 65.1 percent), and planned to work in a state other than the one in which they earned the doctorate (60.7 percent versus 55.9 percent). As these statistics indicate, though, the differences narrow between college and employment. Concerning employment in a state in which they had earlier "roots"—birth, high school, or college—doctorate recipients from families with higher levels of formal education exhibited slightly lower tendencies to stay or return "home." (See Table 1.)

Migration and Employment Sector

The mobility of S&E doctorate recipients varied according to their employment plans. The SED solicited information on the intended employment sector—academic, government, private industry and business, or "other"[13]—of each new doctorate recipient who had accepted employment or intended to pursue a job (as opposed to those with post-doctoral study plans). Although there was little difference by employment sector with respect to interstate migration between birth and high school, from high school to college, or college to doctoral program, those who intended to work in the academic sector were the most likely to move from the state of their doctorate institution. (See Tables 1 and 2.) Those in the more heterogeneous "other" category, where elementary and secondary school teaching is the dominant field, exhibited consistently less interstate migration than the other three employment sectors for virtually all postdoctoral employment comparisons in Tables 1 and 2.

Migration and Field of Academic Study

The migration patterns of S&E doctorate recipients depended in part on the field of academic study. Students whose degrees were in engineering, computer science, biological science, and psychology were the most likely to have initial postdoctoral employment in the same state as their doctoral institution. In contrast, those with degrees in chemistry were the least likely to have employment in the same state as their doctoral institution. Physics/astronomy doctorate recipients were the least likely to have remained in the same state for all of the chronological markers reported on the SED. (See Table 3.)[14]

[11] These tabulations are available from the authors.

[12] The SED collected information on the level of educational attainment of recipients' parents. Two groups were derived for this analysis—families in which neither parent had received a baccalaureate degree and those in which one or both parents had a bachelor's degree or higher (29.3 and 70.7 percent, respectively). The survey does not collect information on parental income, which is likely positively associated with educational attainment, and in turn may be an important variable in migration decisions.

[13] "Other" sectors include working for a non-profit organization, teaching in an elementary or secondary school, or employment by the United Nations or another international agency.

[14] For a state-by-state and broad-field breakdown of doctorate recipients in 1998 who were planning to work in the same state from which they were graduated from high school, see Table 28, page 61, in *Doctorate Recipients from United States Universities: Summary Report 1998* (Chicago: National Opinion Research Center, 1999).

With respect to interstate migration of S&E graduates, students whose doctorate was in chemistry or the agricultural sciences were the least likely to leave their state of birth by high school and college matriculation. However, their rate of changing states for their doctoral education and postdoctoral employment was above the average for S&E fields. (See Table 4.)

For comparison purposes, tables 3 and 4 also include doctorate recipients from non-S&E disciplines, which include the humanities, education, the health sciences, and professional fields. Overall, the 1999 S&E doctoral recipients were more likely than their non-S&E peers to have experienced an interstate relocation between birth and high school, enter an out-of-state college or university, move to another state for their doctoral program, or secure employment in a state other than the one in which they earned the doctorate. (See Table 4.) However, this is largely because those in the heterogeneous "other" category with respect to field of study, almost two-thirds of which was composed of doctorate recipients in education, were the least likely to migrate.[15] Doctorate recipients in the humanities generally exhibited more migration than those in S&E fields prior to postdoctoral employment.

Summary

Science and engineering doctorate recipients are highly mobile. Before they reached their mid-thirties (the median age at time of degree conferral for this cohort was less than 33), many of these young scholars had moved across state borders to attend college, and most had done so to select a doctoral program as well as to accept employment. Earlier in life, about a third of them finished high school in a state other than the one in which they had been born, and a similar proportion began their undergraduate studies out of state. About one in nine doctorate recipients grew up, was educated, and planned to be employed professionally after their doctorate in the same state; only about one-fourth of them planned to work upon completion of their doctorate in a state in which they had been born, last attended high school, or began college.[16] Marital status and the educational attainment of these recipients' parents appear to influence migration significantly. The analyses of migration presented in this InfoBrief are consistent with those from other researchers, and suggest that migration among the doctorate population is both extensive and ongoing.

For further information about this InfoBrief, the Survey of Earned Doctorates, or related reports, contact:

Susan T. Hill
Human Resources Statistics Program
Division of Science Resources Statistics
National Science Foundation
4201 Wilson Boulevard, Suite 965
Arlington, VA 22230
(703) 292-7790
sthill@nsf.gov

Additional reports and information about the nation's science and engineering resources can be found on the SRS web site: http://www.nsf.gov/sbe/srs/

[15] Sixty-four percent of the 6,838 students in the "other" field grouping are in education; 14 percent are in the health sciences; and 22 percent in professional fields such as business, communications, and theology.

[16] See also a 1991 study, *Migration of U.S. Citizen S/E Doctorate-holders Among States and Regions* (Susan T. Hill, National Science Foundation/Division of Science Resources Studies, 1993). Among S&E doctorate recipients from 1986-88, 65 percent earned a bachelor's degree in the same state as they received a high school diploma, 30 percent went to high school and doctoral institution in the same state, 22 percent intended to return to the state where they attended high school after completion of the doctorate, and 38 percent were going to work or continue postgraduate study in the same state as their doctoral institution. For the 1999 S&E cohort, those percentages are 62.2 percent, 25.8 percent, 25.2 percent, and 40.8 percent, respectively.

Table 3. **Percentage of native-born U.S. citizen 1999 doctorate recipients with various patterns of residential stability, by field of doctorate**

Field of doctorate	Number	First employment after doctorate is in the same state as:[2]				All 5 in the same state[3]
		Birth	Finished high school	Began college	Received doctorate	
Total	23,153	24.5	29.7	28.8	45.6	13.7
Science & engineering	12,763	20.8	25.2	24.3	40.8	10.8
Engineering	1,950	19.9	24.1	24.6	44.1	11.0
Physics/astronomy	641	13.7	16.5	16.2	33.1	5.9
Chemistry	1,071	18.3	20.6	20.4	29.7	8.9
Earth, atmospheric, ocean sciences	399	15.8	20.6	20.3	41.4	8.3
Mathematics	444	17.8	23.2	21.8	34.7	8.1
Computer science	303	17.8	20.5	26.1	44.2	9.2
Biological science	3,044	19.9	25.1	23.9	44.3	11.0
Agricultural science	421	18.3	22.6	22.3	37.3	10.0
Psychology	2,673	28.3	34.0	31.5	45.5	14.9
Social science	1,817	18.7	22.6	21.0	35.1	8.4
Non-science & engineering	10,390	29.0	35.3	34.2	51.6	17.2
Humanities	3,552	19.1	23.6	22.8	39.6	8.7
Other[1]	6,838	34.1	41.4	40.1	57.9	21.7

[1] "Other" non-S&E fields include education (64 percent), health sciences (14 percent), and professional fields such as business, communications, and theology (22 percent).

[2] State of first postdoctoral employment or residence.

[3] The respondent was born, finished high school, began college, received doctorate, and accepted first postdoctoral employment, all in the same state.

SOURCE: National Science Foundation/Division of Science Resources Statistics, Survey of Earned Doctorates 1999

Table 4. **Percentage of native-born U.S. citizen 1999 doctorate recipients who migrated interstate between various life events, by field of doctorate**

Field of doctorate	Number	Between birth and finishing high school	Between finishing high school and starting college	Between starting college and completing doctorate	Between completing doctorate and first postdoctoral employment[2]
Total	23,153	34.0	36.1	68.8	54.4
Science & engineering	12,763	35.5	37.8	71.1	59.2
Engineering	1,950	37.2	37.4	67.2	55.9
Physics/astronomy	641	36.3	41.8	77.5	66.9
Chemistry	1,071	29.4	30.2	74.1	70.3
Earth, atmospheric, ocean sciences	399	41.4	44.1	74.7	58.6
Mathematics	444	35.1	42.3	71.6	65.3
Computer science	303	40.9	44.9	70.3	55.8
Biological science	3,044	36.5	36.5	70.4	55.7
Agricultural science	421	31.1	29.9	73.4	62.7
Psychology	2,673	34.2	36.6	68.7	54.5
Social science	1,817	36.5	43.6	74.7	64.9
Non-science & engineering	10,390	32.1	33.9	65.9	48.4
Humanities	3,552	37.9	44.4	76.1	60.4
Other[1]	6,838	29.0	28.5	60.6	42.1

[1] "Other" non-S&E fields include education (64 percent), health sciences (14 percent), and professional fields such as business, communications, and theology (22 percent).

[2] State of first postdoctoral employment or residence.

SOURCE: National Science Foundation/Division of Science Resources Statistics, Survey of Earned Doctorates 1999

MS NIOUI BECKRUM
DATABASE COORDINATOR
ERIC / CSMEE
1929 KENNY RD
#200
COLUMBUS OH 43210-1015

NSF 02-311

NATIONAL SCIENCE FOUNDATION
ARLINGTON, VA 22230

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE $300

RETURN THIS COVER SHEET TO ROOM P35 IF YOU DO NOT WISH TO RECEIVE THIS MATERIAL □ . OR IF CHANGE OF ADDRESS IS NEEDED □ , INDICATE CHANGE INCLUDING ZIP CODE ON THE LABEL. (DO NOT REMOVE LABEL).

PRESORTED STANDARD
POSTAGE & FEES PAID
National Science Foundation
Permit No. G-69

U.S. Department of Education
Office of Educational Research and Improvement (OERI)
National Library of Education (NLE)
Educational Resources Information Center (ERIC)

NOTICE

Reproduction Basis

	This document is covered by a signed "Reproduction Release (Blanket)" form (on file within the ERIC system), encompassing all or classes of documents from its source organization and, therefore, does not require a "Specific Document" Release form.
X	This document is Federally-funded, or carries its own permission to reproduce, or is otherwise in the public domain and, therefore, may be reproduced by ERIC without a signed Reproduction Release form (either "Specific Document" or "Blanket").